CLAIMS

What is claimed is:

- 1 1. A method of controlling the optimization of a complex process having associated operational variables and process outputs, the method comprising the steps of:
- defining a series of corrective actions associated with the process;
- 4 modeling a relationship between the operational variables and the process outputs
- 5 measured over time;
- for each corrective action, computing a risk reduction associated with the process outputs; and
- 8 determining an urgency metric, based at least in part on the risk reductions, for 9 each of the corrective actions.
- 1 2. The method of claim 1 wherein the corrective actions comprise maintenance
- 2 operations.
- 1 3. The method of claim 1 wherein the corrective actions comprise part replacements.
- 1 4. The method of claim 1 wherein the corrective actions comprise recipe
- 2 adjustments.
- 1 5. The method of claim 1 wherein the relationship between the operational variables
- 2 and the process outputs is modeled using a nonlinear regression model.
- 1 6. The method of claim 5 wherein the nonlinear regression model comprises a neural
- 2 network.
- 1 7. The method of claim 1 wherein the urgency metrics are determined based on a
- 2 cumulative sum of one or more risk reductions.
- 1 8. The method of claim 1 further comprising performing a corrective action based at
- 2 least in part on the urgency levels.
- 1 9. The method of claim 8 further comprising performing a corrective action based at
- 2 least in part on the cost of performing the corrective action.

- 1 10. An article of manufacture having a computer-readable medium with computer-
- 2 readable instructions embodied thereon for performing the method of claim 1.
- 1 11. A system for controlling the optimization of a complex process having associated
- 2 operational variables and process outputs, the system comprising:
- 3 (a) a process monitor for monitoring process outputs over time; and
- 4 (b) a data processing device for receiving, from the process monitor, data
- 5 indicative of values of the process outputs, and determining the urgency levels for one or
- 6 more corrective actions based on (i) a risk reduction associated with the process outputs,
- 7 and (ii) a relationship between the operational variables and the process outputs.
- 1 12. The system of claim 11 further comprising an optimizer for determining one or
- 2 more corrective actions, based at least in part on the risk reductions.
- 1 13. The system of claim 12 wherein the optimizer is part of the data processing
- 2 device.
- 1 14. The system of claim 11 further comprising a process controller, responsive to the
- 2 optimizer, for initiating one or more corrective actions.
- 1 15. The system of claim 11 further comprising a database module for storing at least
- 2 one of target process metrics; corrective action costs; process state information; and
- 3 possible corrective actions.
- 1 16. The system of claim 11 wherein the corrective actions comprise maintenance
- 2 operations.
- 1 17. The system of claim 11 wherein the corrective actions comprise part
- 2 replacements.
- 1 18. The system of claim 11 wherein the corrective actions comprise recipe
- 2 adjustments.